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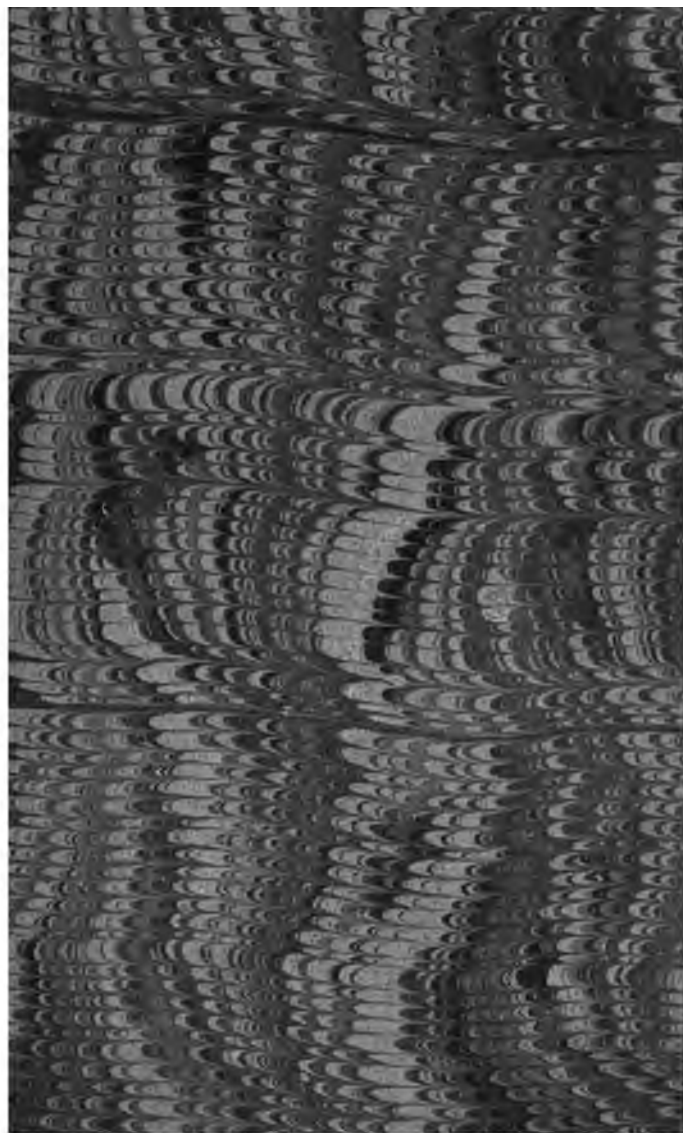
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HIND'S
ASTRONOMICAL
VOCABULARY.

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AN
ASTRONOMICAL VOCABULARY:

BEING

An Explanation of all Terms

IN USE AMONGST ASTRONOMERS AT THE
PRESENT DAY.

BY

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P R E F A C E.

IN order to keep pace with the requirements of modern astronomy, many new terms have been introduced of late years, and the significations of some of the old ones extended or altered; the Constellations have been wholly revised, proper names assigned to some of the Satellites, and the list of Planets greatly augmented. In the present little work I have endeavoured to embody, as far as possible, the whole of these additions and alterations; and the reader will find a short explanation of every term he is likely to meet with in astronomical publications. As far as my limits allowed, I have also attempted to extend the use of the work by the introduction of descriptive notices and facts bearing upon the different subjects.

It must be understood that this Vocabulary is not intended to include optical or mechanical terms, which *could not have been inserted without greatly extending*

its limits. But few of these, therefore, will be found. The reader who wishes for information respecting astronomical instruments and their minutæ, will do well to consult Capt. Smyth's 'Cycle of Celestial Objects,' without exception, the most useful and instructive work of the kind with which I am acquainted.

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GROVE ROAD, ST. JOHN'S WOOD, LONDON,

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EXPLANATION

OF

ASTRONOMICAL SYMBOLS AND ABBREVIATIONS.

SIGNS OF THE ZODIAC.

Aries	♈	Leo	♌	Sagittarius	♐
Taurus	♉	Virgo	♍	Capricornus	♑
Gemini	♊	Libra	♎	Aquarius	♒
Cancer	♋	Scorpio	♏	Pisces	♓

THE SUN AND LARGER PLANETS.

The Sun	☉	Mars	♂
The Moon	☾	Jupiter	♃
Mercury	☿	Saturn	♄
Venus	♀	Uranus	♅
The Earth	♁ or ♂	Neptune	♆

THE MINOR PLANETS.

Ceres	♁	Hygeia	♁*
Pallas	♁†	Parthenope	♁‡
Juno	♁‡	Victoria	♁♁
Vesta	♁☐	Egeria	♁☐
Astræa	♁♁	Irene	♁♁
Hebe	♁☐	Eunomia	♁♥
Iris	♁*	Psyche	♁*
Flora	♁♁	Thetis	♁♁
Metis	♁♁	Melpomene	♁♁
Fortuna	♁♁		

VARIOUS.

♈	Ascending Node	h	Hour
♉	Descending Node	m	Minute of <i>time</i>
♊	Conjunction	s	Second of <i>time</i>
♋	Opposition	α or R.A.	Right Ascension
□	Quadrature	N.P.D.	North Polar Dis-
°	Degree		tance
'	Minute of <i>Arc</i>	δ	} Declination : + North - South
"	Second of <i>Arc</i>		

NOTE.—Some astronomers have adopted a different series of symbols for the minor planets to that given above. Each planet is distinguished by its number in order of discovery inscribed within a circle: thus Ceres is called (1), Pallas (2), . . . Fortuna (19), and a planet named Massalia (announced while these sheets are passing through the press) will be (20). Although this plan may have some advantages, it is more difficult to call to mind the number belonging to any planet, without a table of reference constantly at hand, than it is to remember the symbols given above. The rainbow and star for Iris, and the butterfly's wing with star for Psyche, are more easily fixed upon the memory than their numbers in order of discovery—(7) and (16). It is, however, more usual to distinguish the planets by their names than by either system of symbols.

ASTRONOMICAL VOCABULARY.

A.

Aberration of Planets and Comets, is an apparent displacement of their positions, arising from the progressive motion of light, whereby we always see them *behind* their true places in the heavens at the moment of observation. To distinguish this phenomenon from the *aberration of the fixed stars*, which is quite a different effect, it might be more properly termed the *Equation of Light*.

Aberration of the Fixed Stars, is an alteration of their mean positions, caused by the earth's orbital movement, the effect of which is to make each star apparently describe in the heavens a small ellipse, having for its centre the point which the star would occupy if the earth were at rest.

Aberration, Constant of.—Light travels at the rate of 191,400 miles in a second of time, and is $8^m 17.8^s$ in coming from the sun to the earth. In this interval the earth has moved, with her average velocity, through an arc of $20.45''$, which is therefore the amount of displacement in the sun's longitude, arising from the progressive motion of light, and is termed the *Constant of Aberration*.

Achernar.—The bright star in Eridanus, called also α Eridani.

Achronical rising or setting of the heavenly bodies. A star is said to rise or set achronically when it is in the horizon at sun-setting.

Aerolite.—A name (amongst many others) given to those solid masses which occasionally fall to the surface of the earth from the upper regions of the atmosphere. They are also termed meteoric stones, meteorites, bolides, and, more popularly, *fire-balls*, because in their descent they appear to be burning, and sometimes explode with a report like that of thunder.

Age of the moon. The interval of time which has elapsed since the previous new moon.

Aldebaran.—The bright star in the constellation Taurus called also α Tauri.

Algenib.—One of the principal stars in the constellation Pegasus, known also as γ Pegasi.

Algorab.—The chief star in the constellation Corvus, called also α Corvi.

Alioth.—One of the seven bright stars in the constellation Ursa Major.

Altair.—The bright star in the constellation Aquila, termed also α Aquilæ.

Altitude.—The angular distance of a heavenly body from the horizon, measured in the direction of a great circle passing through the zenith.

Amplitude.—The horizontal distance of a star from the east or west points.

Andromeda.—One of the ancient northern constellations.

Angle of Excentricity. — A term frequently employed amongst astronomers to denote the angle whose sine is equal to the excentricity of an orbit. It is the angle formed at the extremity of the minor axis of the ellipse by lines drawn to the centre and one of its foci, and is usually denoted by the Greek letter ϕ .

Angle of Position.—This term is now generally confined to double stars, or to distinguish the position of celestial objects which are apparently very near to each other. It is the angle formed by a line joining the stars, with the meridian passing through the larger one, and is reckoned from 0° to 360° , beginning at the *North* point, and counting round by the *East*.

Angle of Situation, formerly called the 'angle of position,' is the angle made at a star by arcs passing through the zenith and pole respectively. It is also termed the Parallaxic Angle.

Angle of the Vertical is the difference between the geographical and geocentric latitudes of a place upon the earth's surface. It is zero on the equator, and increases up to the 45th degree of latitude, where it amounts to $11' 30''$, and thence diminishes to zero again at the pole.

Angular Velocity of a double star, is the motion in a certain time of one star round the other.

Annual Equation, an inequality in the motion of the moon arising from the excentricity of the earth's orbit, whereby the diurnal motion of the moon is sometimes quicker, and at other times slower than her mean motion.

Annual Parallax.—See *Parallax*.

Annual Variation of the right ascension or declination of

a star, is the change produced in either element by the effect of precession of the equinoxes and proper motion of the star taken *together*.

Annular Eclipse of the Sun.—See *Eclipse*.

Anomalistic Period.—The time of revolution of a primary or secondary planet in reference to its line of apsides. In the case of the earth this period is called the anomalistic year.

Anomaly, Excentric.—An auxiliary angle employed to abridge the calculations connected with the motion of a planet or comet in an elliptic orbit. If a circle be drawn, having its centre coincident with that of the ellipse, and a diameter equal to the transverse axis of the latter, and if from this axis a perpendicular be drawn through the true place of the body in the ellipse to meet the circumference of the circle, then the excentric anomaly will be the angle formed by a line drawn from the point where the perpendicular meets the circle, to the centre, with the longer diameter of the ellipse.

Anomaly, Mean.—The angular distance of a planet or comet from perihelion or aphelion, supposing it to have moved with its *mean* velocity.

Anomaly, True.—The true angular distance of a comet or planet from perihelion or aphelion.

Anse of Saturn's ring.—The projections or arms of the ring on each side of the globe of the planet.

Antares, the bright star in the constellation Scorpio, called also α Scorpii.

Antlia.—An abbreviation for Antlia Pneumatica, one of the southern constellations introduced by Lacaille.

Aphelion.—That point in the orbit of a planet or comet which is farthest from the sun, and at which the angular motion is slowest.

Apogee is that point in the moon's orbit which is farthest from the earth, or the point in the earth's orbit which is most distant from the sun. The word is also used as a general term to express the greatest distance of any heavenly body from the earth.

Apparent Equinox.—The position of the equinox as affected by nutation.

Apparent Place of a star for any day, is the position it seems to occupy in the heavens, as affected with aberration and nutation.

Apparent Noon.—The instant that the sun's centre is on the meridian of a place.

Apparent Time.—See *Time*.

Apsides, Line of.—The line joining the aphelion and perihelion points in the orbit of a planet.

Apus.—One of the southern constellations.

Aquarius.—The eleventh sign of the zodiac, which the sun enters about the 21st day of January. It is one of the ancient zodiacal constellations.

Aquila.—One of the ancient northern constellations.

Ara.—An ancient southern constellation.

Arcturus.—The principal star in the constellation *Bootes*, and one of the brightest in the northern heavens; called also *α Bootis*.

Argo Navis.—A very extensive southern constellation, introduced by the ancients. Its inconvenient extent

has led Sir John Herschel to subdivide it into four parts, by which alteration the stars are more readily referred to. These subdivisions are, *Carina*, *Puppis*, *Vela*, and *Malus*.

Argument is a term used to denote any number or quantity by which another may be found.

Argument of latitude.—The distance of a body from one of the nodes of its orbit, upon which the latitude depends.

Ariel.—A name given by Sir John Herschel to one of the interior satellites of Uranus.

Aries.—The first sign of the zodiac, which the sun enters at the vernal equinox, on the 21st of March. It is one of the ancient zodiacal constellations. The commencement of this sign, called the *first point of Aries*, is the origin from which the right ascensions of the heavenly bodies are reckoned upon the equator, and their longitudes upon the ecliptic.

Ascending Node.—See *Node*.

Ascension, Oblique.—The oblique ascension is the arc of the equator between the first point of Aries and the point of the equator which rises with a star or other heavenly body, reckoned according to the order of the signs.

Ascension, Right.—The distance of a heavenly body from the first point of Aries, measured upon the equator.

Ascensional Difference is the difference between the right and oblique ascension.

Astræa.—One of the minor planets. See *Planet*.

Astrometry.—The numerical expression of the apparent *magnitudes of the fixed stars*.

Augmentation of Moon's Semidiameter, is the increase due to the difference between her distance from the observer and the centre of the earth.

Auriga.—One of the ancient northern constellations.

Axis.—The imaginary line upon which a planet revolves. It is the line joining the north and south poles.

Axis of an Orbit.—The major-axis of the orbit of a planet is the line joining its aphelion and perihelion points. The minor-axis is the line perpendicular to the former, and passing through the centre of the ellipse.

Azimuth.—The angular distance of an object from the north or south points, or the angle formed with the meridian by a great circle passing through the zenith and the object.

Azimuthal Error.—The deviation of a transit instrument from the plane of the meridian. Its effect is greatest in the horizon, and vanishes in the zenith. It is sometimes called the Meridian Error.

B.

Bellatrix.—A bright star in the constellation Orion, called also γ Orionis.

Belts of Jupiter.—Faint dusky streaks crossing the planet's surface; they are supposed to be openings in his atmosphere, which allow of our seeing portions of his dark body, or of the globe itself.

Betelgeuz.—A bright star in the constellation Orion, called also α Orionis.

Bifid.—See *Tail of a Comet*.

Binary System.—When the two stars forming a double star revolve about each other, as is frequently the case, they are said to compose a binary star.

Bootes.—One of the ancient northern constellations.

C.

Cælum.—An abbreviation of *Cælum Sculptorium*, one of the southern constellations introduced by Lacaille.

Calendar.—A tabular statement of the chronological epochs corresponding to any year, with the fixed and moveable festivals, and other matters connected with the reckoning of time.

Camelopardus.—A northern constellation introduced by Hevelius of Dantzic, one of the most distinguished astronomers of the seventeenth century.

Cancer.—The fourth sign of the zodiac, which the sun enters about the 21st of June, and one of the ancient zodiacal constellations. The beginning of the sign Cancer, 90° distant from the first point of Aries, is called the *Summer Solstice*.

Canes Venatici.—A northern constellation introduced into the heavens by Hevelius.

Canis Major.—An ancient southern constellation. The principal star is called *Sirius*.

Canis Minor.—An ancient southern constellation. The principal star is called Procyon.

Canopus. The principal star in the southern constellation, Argo Navis, and one of the brightest in the heavens; called also α Argús.

Capella.—The bright star in the northern constellation Auriga; called also α Aurigæ.

Capricornus.—The tenth sign of the zodiac, which the sun enters about the 21st of December, and one of the ancient zodiacal constellations. The beginning

of the sign Capricornus, 270° from the first point of Aries, is called the *Winter Solstice*.

Cassiopea.—An ancient northern constellation.

Castor.—One of the principal stars in the zodiacal constellation Gemini, and remarkable as being composed, under telescopic examination, of two stars, which are found to be in motion round their common centre of gravity. It is called also α Geminorum.

Catalogue of Stars.—A list of the right ascensions and declinations of certain stars, arranged in order of right ascension. Some of the more extensive catalogues contain twenty, thirty, or even forty thousand stars, and upwards.

Centaurus.—One of the ancient southern constellations.

Centesimal Division.—A division of the circle occasionally employed in astronomical tables. The circumference is divided into 400 degrees, each degree into 100 minutes, and each minute into 100 seconds.

Central Eclipse.—See *Eclipse*.

Cepheus.—One of the ancient northern constellations.

Ceres.—One of the minor planets. See *Planet*.

Cetus.—One of the ancient southern constellations.

Circinus.—One of the southern constellations introduced by Lacaille.

Circle, Mural.—An instrument used to determine the declination of the heavenly bodies, and consisting of a circle of brass connected by radii with a long metallic axis, which is attached to one side of a stone pier placed in the meridian, the telescope being firmly fixed on the outer side of the circle. *Mural circles*

have been used until within a very recent period at the Royal Observatory, Greenwich, and are still employed at Cambridge, Oxford, Edinburgh, &c.

Circle, Transit.—An instrument designed for ascertaining, at the same observation, the right ascension and declination of a heavenly body at its transit over the meridian. It differs from the mural circle in having both ends of the metallic axis resting usually upon stone piers.

Circumpolar, in the vicinity of one of the poles of the heavens. The circumpolar region is generally understood to include that portion of the starry sphere which remains continually above the horizon of any place.

Clock-stars.—Certain bright stars which, from their positions having been very exactly determined, are used for regulating astronomical clocks.

Cluster of Stars.—A number of stars very closely congregated, so as frequently to require powerful telescopes to resolve the mass into separate points.

Co-latitude.—The complement of the latitude, or its difference from 90° .

Collimation, Error of.—A deviation of the centre wire of a transit instrument from its optical axis.

Columba.—One of the southern constellations introduced by Lacaille.

Colure, Equinoctial.—A great circle passing through the poles and the equinoctial points.

Colure, Solstitial.—A great circle passing through the poles and the solstitial points.

Coma.—The nebulous atmosphere surrounding the nucleus of a comet.

Coma Berenices.—One of the northern constellations introduced by Hevelius.

Comes.—The companion or lesser component of a double star.

Comet.—A nebulous body belonging to the solar system, which is usually visible only for a few weeks or months, when nearest the sun. The generality of comets are supposed to revolve in elliptic orbits of great eccentricity, and in periods which, in most cases, extend to hundreds and often to thousands of years. See *Coma, Nucleus, Tail of a Comet, and Envelope*.

Cometography.—The history and description of comets.

Compression of the Poles, is the amount of flattening at the polar regions of a planet by which the polar diameter is less than the equatorial.

Conjunction.—Two bodies are said to be in conjunction when they have the same longitude or right ascension. The moon is in conjunction with the sun at the time of new moon, both luminaries having then the same longitude; this is the *Ecliptic* conjunction.

Constellation.—A number of stars included within some imaginary figure for the sake of easier identification. There are forty-eight* constellations, which were formed more than two thousand years ago, and are all referred to by Claudius Ptolemy, the Egyptian astronomer, in his great work called the *Almagest*; these are usually termed the *ancient* constellations. Others were introduced by Hevelius, a famous Prussian astronomer of the seventeenth century, and more recently M. de Lacaille has added a consider-

* Ptolemy has the constellation *Antinous*, now included in *Aquila*.

able number to fill up vacant spaces in the southern heavens. Some of the stars have proper names attached to them, by which they are commonly distinguished, but the great majority of those visible to the naked eye are known either by a number or letter, followed by the name of the constellation in which they are included: the Greek alphabet is employed for this purpose as far as it extends. Thus the bright star in the head of Taurus is called Aldebaran, or α Tauri; another, ϵ Tauri, and so on. The following is a list of the constellations, as arranged at the present day by the first astronomical authorities:—

I.—THE ANCIENT CONSTELLATIONS.

Northern: twenty in number.

Andromeda . . . <i>Andromeda</i>	Hercules . . . <i>Hercules</i>
Aquila . . . <i>The Eagle</i>	Lyra . . . <i>The Lyre</i>
Auriga . . . <i>The Charioteer</i>	Ophiuchus
Bootes . . . <i>Bootes</i>	or Ser-
Cassiopea . . . <i>Cassiopea</i>	pentarius } <i>The Serpent</i>
Cepheus . . . <i>Cepheus</i>	
Corona Bo-	Pegasus * } <i>The Flying</i>
realis }	
<i>The Northern</i>	<i>Horse</i>
<i>Crown</i>	Perseus . . . <i>Perseus</i>
Cygnus . . . <i>The Swan</i>	Sagitta . . . <i>The Arrow</i>
Delphinus . . . <i>The Dolphin</i>	Triangulum . . . <i>The Triangle</i>
Draco . . . <i>The Dragon</i>	Ursa Major . . . <i>The Gr. Bear</i>
Equuleus . . . <i>Equuleus</i>	Ursa Minor . . . <i>The Lit. Bear</i>

Zodiacal: twelve in number.

Aries . . . <i>The Ram</i>	Cancer . . . <i>The Crab</i>
Taurus . . . <i>The Bull</i>	Leo . . . <i>The Lion</i>
Gemini . . . <i>The Twins</i>	Virgo . . . <i>The Virgin</i>

Libra . . .	<i>The Balance</i>	Aquarius	{ <i>The Water</i>
Scorpio . . .	<i>The Scorpion</i>		{ <i>Bearer</i>
Sagittarius . . .	<i>The Archer</i>	Pisces	<i>The Fishes</i>
Capricornus	<i>The Goat</i>		
<i>Southern : fifteen in number.</i>			
Ara . . .	<i>The Altar</i>	Crater	<i>The Cup</i>
Argo Navis.	<i>The Ship Argo</i>	Eridanus . . .	<i>Eridanus</i>
Canis Major	<i>The Gt. Dog</i>	Hydra . . .	<i>The Hydra</i>
Canis Minor	<i>The Lit. Dog</i>	Lepus	<i>The Hare</i>
Centaurus . . .	<i>The Centaur</i>	Lupus	<i>The Wolf</i>
Cetus . . .	<i>The Whale</i>	Orion	<i>Orion</i>
Corona	} <i>The Southern</i>	Pisces Aus-	} <i>The Southern</i>
Australis		tralis	
Corvus . . .	<i>The Crow</i>		

II.—THE CONSTELLATIONS INTRODUCED BY HEVELIUS :

Nine in number.

Camelopardus,	<i>The Giraffe</i>	Leo Minor	{ <i>The Lesser</i>
Canes	} <i>The Hunting</i>		{ <i>Lion</i>
Venatici		<i>Dogs</i>	Lynx
Coma	} <i>Berenice's</i>	Monoceros . . .	<i>The Unicorn</i>
Berenices		<i>Hair</i>	Sextans
Lacerta . . .	<i>The Lizard</i>	Vulpecula . . .	<i>The Fox</i>

III.—THE SOUTHERN CONSTELLATIONS OF LACAILLE,
AS REVISED :*Twenty-seven in number.*

Antlia Pneumatica (<i>Antlia</i>)*	<i>The Air-Pump</i>
Apparatus (vel Officina) Sculp-	} <i>The Sculptor's Workshop</i>
toris (<i>Sculptor</i>)	

* The names within the parentheses are the abbreviations used amongst astronomers.

Apus	<i>The Bird of Paradise</i>
Cæla Sculptoria (<i>Cælum</i>)	<i>The Sculptor's Tools</i>
Chamelion	<i>The Chamelion</i>
Circinus	<i>The Compass</i>
Columba	<i>The Dove</i>
Crux	<i>The Southern Cross</i>
Dorado	<i>The Sword Fish</i>
Equuleus Pictorius (<i>Pictor</i>)	<i>The Painter's Easel</i>
Fornax	<i>The Furnace</i>
Grus	<i>The Crane</i>
Horologium	<i>The Clock</i>
Hydrus	<i>The Water-Snake</i>
Indus	<i>The Indian</i>
Microscopium	<i>The Microscope</i>
Mons Mensæ (<i>Mensa</i>)	<i>The Table Mountain</i>
Musca	<i>The Bee</i>
Norma	<i>The Rule</i>
Octans	<i>The Octant</i>
Pavo	<i>The Peacock</i>
Phoenix	<i>The Phoenix</i>
Piscis Volans (<i>Volans</i>)	<i>The Flying Fish</i>
Reticulum	<i>The Net</i>
Telescopium	<i>The Telescope</i>
Toucan	<i>The Toucan</i>
Triangulum Australe	<i>The Southern Triangle</i>

Copernican System.—The received theory of the Universe revived by Copernicus, a Prussian astronomer, in the sixteenth century. In this system the sun occupies *the central place*, and the planets with their attendant *satellites* revolve about him.

- Contact, External*, in a transit of Mercury or Venus over the sun's disk, is the joining together of the border of the planet and the sun's edge before any part of the former is projected on the disc of the luminary.
- Contact, Internal*, in a transit of Mercury or Venus, takes place when the planet is just *wholly* within the sun's disc.
- Cor Caroli*.—A name given to the bright star in the constellation Canes Venatici.
- Cor Hydræ*.—The principal star in the constellation Hydra, called also α Hydræ.
- Corona*.—The luminous ring or 'glory' which surrounds the dark body of the moon during an eclipse of the sun.
- Corona Australis*.—One of the ancient southern constellations.
- Corona Borealis*.—One of the ancient northern constellations.
- Corvus*.—An ancient southern constellation.
- Cosmical*.—A star is said to rise or set cosmically when it is in the horizon at sun-rise.
- Crater*.—An ancient southern constellation.
- Cruz*.—One of the modern southern constellations.
- Culmination*.—The passage of a heavenly body over the meridian of a place.
- Curtate distance*.—The distance of a body from the sun or earth projected upon the plane of the Ecliptic.
- Cusps*.—The extremities of a *crescent* moon, or inferior planet.

Cycle of Eclipses.—A period of about 6586 days, which is the time of a revolution of the moon's node: after the lapse of this period eclipses recur in the same order as before, with few exceptions. This cycle was known to the ancients under the name of *Saros*.

Cycle, Solar.—A period of twenty-eight years, after which the days of the week correspond in the same order to the days of the month.

Cygnus.—One of the ancient northern constellations.

D.

Day, Mean Solar, is the interval of time which elapses between two successive meridian transits of the *mean sun*, and is sometimes longer, and at others shorter, than the *true solar day*, which is the interval between two successive transits of the real sun over the meridian of a place. The mean solar day is the unit of time in common use amongst us.

Day, Sidereal, is the interval elapsing between two successive meridian transits of a fixed star, and is equivalent to $23^{\text{h}} 56^{\text{m}} 4\cdot09^{\text{s}}$ mean solar time.

Declination.—The angular distance of a heavenly body from the equator either *north* or *south*. The complement of the declination is termed the *polar distance*.

Degree, in the sexagesimal division of the circle, is the 360th part of the circumference: in the centesimal division, which is much less used, it is the 400th part.

Delphinus.—One of the ancient northern constellations.

Deneb.—The principal star in the constellation Cygnus; called also a *Cygni*.

Density.—The amount of solidity of a body. The planets have various densities, Saturn being the lightest, and hardly exceeding the density of cork.

Descending Node.—See *Node*.

Digit.—A twelfth part of the diameter; a term employed to denote the magnitude of an eclipse.

Dione.—A name given by Sir John Herschel to the fourth satellite of the planet Saturn.

Direct motion.—See *Motion*.

Disc.—The visible surface of the sun, moon, or planet.

Distance, in speaking of double stars, is the space separating the centres of the two stars, expressed in seconds of arc.

Dorado.—One of the southern constellations introduced by Lacaille.

Double-Star.—When two stars lie so close together as to be separable only with the telescope, they are considered as forming a *double-star*: some thousands of such objects exist in the heavens. The duplicity may be owing either to an optical or physical cause: thus, if two stars are nearly in the same line of vision, though one be at a vast distance behind the other, we shall see them close together, in which case the two objects form an *optical* double-star, having no other connexion but the accidental and apparent one which their situation in the heavens gives them. Again, there are stars which really lie near each other in space, one of them revolving round the other, agreeably, as generally supposed, to the law of gravitation: in this case the component stars are physically connected, and the object is therefore termed *physically* double.

Draco.—One of the ancient northern constellations.

Dubhe.—One of the brighter stars in the constellation Ursa Major, commonly known as α Ursæ Majoris.

E.

Earth.—One of the primary planets, upon which we dwell. It is the *third* in order of distance from the sun, and is placed between the orbits of Venus and Mars.

Eclipse.—An obscuration of a heavenly body arising from the interposition of another, or from its passage through the shadow of a larger body.—An *Eclipse of the Sun* is caused by the dark body of the moon passing between him and the earth. When the moon's diameter exceeds the sun's diameter and their centres nearly coincide, a *total* eclipse of the sun takes place: if the moon's diameter be the less, then the eclipse is termed *annular*, because the only visible portion of the sun appears as a bright ring or annulus round the moon's dark body. If the centres of the sun and moon exactly coincide, the eclipse is said to be *central*; and in this case, if the apparent diameters of the two luminaries are the same, the eclipse will be *total, without continuance*. When the centres do not nearly coincide, a portion only of the sun's disc is covered, and a partial eclipse occurs.—An *Eclipse of the Moon* is caused by her passing through the shadow of the earth, and may be *total* or *partial*, according as she is entirely or partially immersed in it. *Eclipses of Jupiter's Satellites* are owing to a similar cause—viz., the transit of the satellites through the shadow of the planet.

Ecliptic.—The great circle of the heavens which the sun appears to us to describe in the course of a year, in

consequence of the earth's motion round that luminary. The plane of the ecliptic or of the earth's path is the general plane of reference in astronomy.

Ecliptic Conjunction.—See *Conjunction*.

Ecliptic Limits.—Certain limits of latitude within which eclipses take place, and beyond which they cannot occur.—The *Solar* ecliptic limits in reference to the moon's latitude are thus defined: an eclipse of the sun will be *certain* when the latitude of the moon is less than $1^{\circ} 23' 15''$, and *impossible* when it is greater than $1^{\circ} 34' 52''$; between these limits it will be doubtful, and a calculation is required. And for the *Lunar* ecliptic limits it is found that an eclipse of the moon is *certain* when her latitude is less than $51' 57''$, and *impossible* when it exceeds $1^{\circ} 3' 45''$; between these limits it is doubtful, and requires a calculation, as in the former case.—The *Ecliptic Limits* are sometimes given in reference to the moon's distance from one of the nodes of her orbit, or to the distance of the centres of the sun and moon; but the limits in respect to latitude are more certain.

Ecliptic, Obliquity of the, is the angle between the planes of the ecliptic and the equator; or, in other words, it is the inclination of the earth's equator to the plane of her annual path, upon which the seasons depend. At the beginning of the year 1852, the obliquity of the ecliptic amounted to $23^{\circ} 27' 31''$; but it is subject to a diminution of about $46''$ in a hundred years.

Egeria.—One of the minor planets. See *Planets*.

Egress at a transit of an inferior planet over the sun, is the passing off of the planet from his disc.

Elements of an Orbit are certain numbers which define the

path of a heavenly body in space, and enable the astronomer to calculate its positions for past or future times.

Elongation.—The angular distance of a heavenly body from the sun, eastward or westward.

Emersion.—The re-appearance of an object after undergoing eclipse.

Enceladus.—A name proposed by Sir John Herschel for the second satellite of Saturn, and now generally adopted.

Envelope.—A stream of light encircling the head of a comet on the side near the sun, and passing round it so as to form the commencement of the tail. The envelope is not seen in all comets.

Ephemeris.—A tabular statement of the geocentric positions of the sun, moon, planets, or comets, for every day at a certain hour, or less frequently.

Epoch.—The time to which certain given numbers or quantities apply.

Equation of the Centre.—The difference between the true and mean anomalies of a planet.

Equation of Equinoxes.—The difference between the mean and apparent places of the equinox.

Equation of Time.—The difference between mean and apparent time. See *Time*.

Equator, Celestial.—The equator of the earth, if extended to the heavens, would trace out a circle called the *Celestial Equator*, and the apparent diurnal motions of the stars and planets due to the revolution of the earth upon her axis, take place in the plane of this *equator*. It is sometimes called the *Equinoctial*.

Equatoreal.—An instrument designed for ascertaining the position of a heavenly body in any situation with respect to the meridian. Mural circles, transit instruments, &c., are permanently fixed in the meridian, and no observation of a star can be taken with them until it has arrived on that line; whereas the equatoreal can be directed at pleasure to any part of the heavens, and is consequently an important addition to an observatory. With the help of two circles, perpendicular to each other, a star may be readily found if its declination or polar distance and the hour angle, east or west, be given.

Equatorial Horizontal Parallax.—See *Parallax*.

Equinoctial Time.—See *Time*.

Equinoxes.—The two points of intersection of the ecliptic and the equator; so called, because on the sun's arrival at either of them, the night is equal in length to the day, throughout the world. That point where the sun crosses the equator, going north, is termed the *Vernal Equinox*; and the opposite point where he passes, with a southerly motion, is called the *Autumnal Equinox*.

Equuleus.—One of the ancient northern constellations.

Era of Nabonassar.—A date of some importance in astronomical chronology, which is fixed by several ancient lunar eclipses observed at Babylon. The commencement dates from B.C. 747.

Eridanus.—One of the ancient southern constellations.

Eunomia.—One of the minor planets. See *Planet*.

Evection.—An inequality in the motion of the moon, caused by a change in the excentricity of her orbit.

whereby her mean longitude is sometimes increased or diminished to the amount of $1^{\circ} 20'$.

Excentricity.—The deviation of an elliptic orbit from a circle. It is usually expressed in parts of the mean distance of a planet or comet,—that is, the ratio which it bears to the mean distance is expressed numerically. See *Angle of Excentricity*.

F.

Faculæ.—Luminous streaks upon the disc of the sun, amongst which the *maculæ* or dark spots usually appear.

Fixed Star.—See *Star*.

Flora.—One of the minor planets. See *Planet*.

Fomalhaut.—The bright star in the constellation *Pisces Australis*, called also, a *Piscis Australis*.

Fornax.—One of the southern constellations, introduced by Lacaille.

Fortuna.—One of the Minor Planets. See *Planet*.

G.

Galactic.—Having relation to the Galaxy, or Milky Way.

Galaxy.—The *Via Lactea*, or Milky Way. See *Via Lactea*.

Gemini.—The third sign of the zodiac, which the sun enters about the 21st of May. It is one of the ancient zodiacal constellations.

Geocentric.—As viewed from the centre of the earth.

Geocentric latitude.—See *Latitude*.

Gibbous.—A name distinguishing the form of the illuminated portion of a planet's disc, when it exceeds a *semi-circle*, but is less than a circle.

Gnomon.—An instrument in use amongst the ancients for determining the altitude of the sun, particularly on the days of the solstices and equinoxes.

Gravitation, Law of.—The great law of nature, established by Sir Isaac Newton, which teaches that every particle of matter in the universe has a tendency to attract every other particle with a force proportioned to the mass of the attracting body, and inversely as the square of the distance between them.

Gravity, Terrestrial, is that law of nature, in virtue of which all bodies have a tendency to fall towards the centre of the earth.

Gregorian Style.—The present improved method of reckoning time, commenced by Pope Gregory XIII., in 1582. The Julian year being longer than the astronomical year, the equinox in the fifteenth century considerably preceded the 21st of March, the day fixed on the arrangement of the calendar by the Council of Nice, A.D. 325. To remedy this inconvenience (the effect of which, in the lapse of time, would have been to bring about winter in June, and summer in December), the Gregorian rule enjoins that, instead of making every fourth year a bissextile, or leap year of 366 days, those only of the secular years 1600, 1700, 1800, &c., which are composed of a *number of centuries* divisible by 4 without remainder, shall consist of this number of days, all others being limited to 365. Thus, in the Gregorian style, 1600, 2000, 2400 are leap years, 1700, 1800, 1900, &c., common years. In speaking of so many *Gregorian years*, it is implied, that the reckoning is made upon the above rule. Russia is the only European country where the *Julian style* is adopted at the present day.

H.

Harvest Moon.—About the autumnal equinox, the moon rises for several consecutive evenings nearly at the same hour; and, in consequence of the advantage which the farmer is supposed to derive from this additional length of moonlight, the full moon nearest the autumnal equinox has been styled the Harvest Moon.

Head of Comet.—The brighter part of a comet, from which the tail proceeds.

Hebe.—One of the minor planets. See *Planet*.

Heliacal.—A star is said to *rise heliacally* when it first becomes visible in the morning, after having been hidden in the sun's rays, and it *sets heliacally* when it is first lost in the strong evening twilight, owing to proximity to the sun. The term *heliacal* was used by the ancient poetical writers.

Heliocentric.—As seen from, or having reference to, the centre of the sun.

Heliometer.—An instrument designed for the accurate measurement of small distances.

Hemisphere.—Half the surface of the heavens. The celestial equator divides the heavens into two hemispheres, the *northern* and the *southern*.

Hercules.—One of the ancient northern constellations.

Horizon.—The *sensible* horizon is that circle of the heavens which limits our view, whose plane touches the earth at the spectator. The *rational*, or *true* horizon, is a *great circle* of the heavens, parallel to the *sensible horizon*, but passing through the centre of the earth.

Horizontal Parallax.—See *Parallax*.

Horns of the Moon.—The extremities of the lunar crescent. The moon is said to be *horned* when she appears in the form of a crescent.

Horologium.—One of the modern southern constellations.

Hour-angle.—The angular distance of a heavenly body east or west of the meridian.

Hyades.—Certain stars in the constellation Taurus, near the bright star Aldebaran.

Hygeia.—One of the minor planets. See *Planet*.

Hyperion.—The name by which the newly discovered *seventh* satellite of Saturn is distinguished.

I.

Immersion.—The *disappearance* of a heavenly body, when undergoing eclipse.

Inclination of an orbit.—The angle which the path of a planet or comet makes with the plane of the ecliptic.

Indus.—One of the modern southern constellations.

Inequality, Great, of Jupiter and Saturn, is a variation in their orbital positions, caused by the disturbing action of one planet on the other, which goes through all its changes of magnitude in about 918 years.

Inequalities, Secular, in the motions of the planets, are small irregularities which become important only after the lapse of hundreds of years.

Inferior conjunction of Mercury or Venus.—The planet is said to be in inferior conjunction when it is situated in the same longitude as the sun, and between that *luminary and the earth*.

Inferior Planet.—See *Planet*.

Intensity of Light.—The degree of brightness of a planet or comet, expressed as a number varying with the distance of the body from the sun and earth.

Irene.—One of the minor planets. See *Planet*.

Iris.—One of the minor planets. See *Planet*.

J.

Japetus.—A name assigned by Sir John Herschel to the *eighth*, or exterior satellite of Saturn, and now generally adopted.

Jovicentric.—As seen from, or having relation to, the centre of Jupiter.

Julian Period.—A period of 7980 years, first imagined by Scaliger. It is the product of the numbers 15, 19, and 28, which are respectively the lengths in years of the Indiction, Metonic Cycle, and Solar Cycle. The Julian period dates from the year 4713 B.C. ; and, as the name implies, the reckoning is exclusively by *Julian years*.

Julian Style.—The mode of reckoning instituted by Julius Cæsar, in which every year, divisible by four without a remainder, consisted of 366 days, and all others of 365.

Julian Year.—A period of $365\frac{1}{4}$ days, which was adopted as the length of the year after the reformation of the calendar by Julius Cæsar.

Juno.—One of the minor planets. See *Planet*.

Jupiter.—One of the ancient superior planets, and the *largest in the solar system*. See *Planet*.

K.

Kepler's Laws.—Certain laws of nature, discovered by Kepler early in the 17th century. I. The primary planets revolve about the sun in ellipses, having the sun in one of the foci. II. The planets describe about the sun equal areas in equal times. III. The squares of the periodic times of the planets are to each other as the cubes of their mean distances from the sun. The first two of these famous laws were announced by Kepler in 1609, and the third in 1618.

L.

Lacerta.—One of the northern constellations introduced by Hevelius.

Latitude, Geocentric.—The angular distance of a place from the equator, as corrected for the oblateness of the earth's form. It is the geographical latitude diminished by the *angle of the vertical*.

Latitude, Geographical.—The angular distance of a place from the equator, assuming the earth to be a perfect sphere.

Leo.—The *fifth* sign of the Zodiac, which the sun enters about the 22nd day of July: it is one of the ancient zodiacal constellations.

Leo, Minor.—A modern constellation introduced by Hevelius.

Lepus.—One of the ancient southern constellations.

Level Error, is the deviation of the axis of a transit instrument from the horizontal position.

Libra.—The *seventh* sign of the Zodiac, which the sun enters about the 21st of September: it is one of the

zodiacal constellations. The commencement of the sign *Libra*, where the equator intersects the ecliptic, is called the *autumnal equinox*.

Libration.—An apparent oscillatory motion of the moon, whereby we sometimes see a little further round one side than at others.

Limb.—The border of the disc of the sun, moon, or a planet.

Longitude, Geocentric.—The geocentric longitude of a heavenly body is its angular distance from the first point of *Aries*, measured upon the ecliptic, as viewed from the *earth*.

Longitude, Heliocentric.—The angular distance of a body from the first point of *Aries* measured upon the ecliptic as seen from the *sun*.

Longitude, Mean.—The angular distance of a planet or comet from the first point of *Aries*, supposing it to have moved with its *mean* rate of motion.

Longitude, True.—The *real* angular distance of a planet or comet from the first point of *Aries*.

Longitude of a place, upon the earth's surface, is the arc intercepted between its meridian and that of some other fixed station used as a line of reference. The English astronomers and geographers reckon their longitudes from the meridian of the Royal Observatory, Greenwich. The French count from the meridian of Paris, and the Germans from that of Berlin. The whole circumference being divided into 360° or 24 hours, each hour corresponds to 15° . In astronomy it is *more convenient* to express the longitudes in hours, *minutes*, and *seconds*.

Lumière Cendrée.—A French term (literally signifying *ash-coloured light*), which is occasionally used by astronomers to denote the faint illumination of the dark part of the moon's surface about the time of new moon, caused by sun-light reflected from the earth to our satellite.

Lunar Distances.—The angular distances between the moon and certain bright stars or planets, which are much used in navigation for finding the longitudes.

Lunation.—The period in which the moon goes through every variety of phase—viz., one synodical revolution.

Luni-solar-precession.—See *Precession*.

Lupus.—One of the ancient southern constellations.

Lynx.—One of the modern northern constellations introduced by Hevelius.

Lyra.—One of the ancient northern constellations.

M.

Maculae.—Dark spots which are frequently observed upon the sun's disc.

Magnitude of an Eclipse.—The proportion which the eclipsed part of the surface of the sun or moon bears to the diameter. It is sometimes expressed in *digits*, but more frequently as a decimal, the diameter being taken as *unity*.

Magnitudes of Stars.—Their relative degree of brightness. The fixed stars are arranged into classes according to their intensity of light: the first six classes include all those distinctly visible to the naked eye; but the astronomer, with his powerful telescopes, is familiar with stars of much fainter orders, ranging from the seventh to the fifteenth or twentieth magnitudes.

Major-axis of an orbit, the line joining the aphelion and perihelion points in the ellipse, called also its *transverse-axis* or *diameter*.

Markab.—The chief star in the constellation Pegasus; called also α Pegasi.

Mars.—One of the ancient superior planets; the next to the earth in order of distance from the sun.

Mass.—By the mass of a planet we understand its weight, or attractive power, expressed in reference to that of the sun. It must not be confounded with the *volume*, which is merely the bulk or solid contents of the body. Jupiter has the largest mass, Saturn coming next.

Massalia.—One of the Minor Planets. See *Planet*.

Mean Anomaly.—See *Anomaly*.

Mean Distance.—The average distance of a planet from the sun—a *mean* between the aphelion and perihelion distances. It is equal to half the longer axis of the ellipse, and hence is frequently termed the *Semi-axis major*.

Mean Equinox.—The position of the equinox independent of the effects of nutation.

Mean Motion.—The rate at which a body moving in an elliptic orbit would proceed, had it to describe the whole circumference at an equal velocity throughout.

Mean Place of a star, is its position at a given time, independent of the effects of aberration and nutation.

Mean Noon.—The time when the centre of the *mean* sun is on the meridian. See *Time*, *Mean*.

Mean Sun.—See *Time*, *Mean*.

Medium, Resisting.—The *resisting medium* is a thin, *ætherial matter*, which modern astronomers have sup-

posed to pervade the planetary spaces, and derives its name from the resistance or hindrance it is found to offer to the motions of the periodical comets, in virtue of which their velocity is diminished and their orbits thereby contracted at every revolution.

Melpomene.—One of the minor planets. See *Planet*.

Mensa, or *Mons Mensæ*.—One of the southern constellations introduced by Lacaille.

Mercury.—One of the ancient inferior planets and the nearest to the sun.

Meridian.—The great circle of the heavens passing through the zenith and the poles. The *plane of the meridian* is the plane of this great circle, and its intersection with the sensible horizon is called the *meridian line*. The *meridian transit* of a heavenly body is the act of passing over the said plane, when it is either due north or south of the observer, as the case may be.

Meteors, Periodical.—There are certain days in the year about which great numbers of meteors or falling stars have been observed for many years consecutively, and the regular occurrence of the phenomenon, the great velocity of some of the meteors, and their distance from the earth's surface, have led astronomers to regard them as cosmical bodies moving in the planetary spaces. The epochs at which the periodical meteors have been most frequently observed are about the 10th of August and the 12th of November.

Metis.—One of the minor planets. See *Planet*.

Metonic Cycle.—A cycle of nineteen years which contains 235 lunations and produces a correspondence in the solar and lunar years. It was discovered by the Greek mathematician, Meton.

Micrometer.—An instrument used to measure the diameters of the heavenly bodies, or small distances between them. See *Ring-Micrometer*: *Wire-Micrometer*.

Microscopium.—One of the southern constellations introduced by Lacaille.

Milky Way.—See *Via Lactea*.

Minor Axis.—The shortest or conjugate diameter of the ellipse: a line passing through the centre, and perpendicular to the longer or transverse diameter.

Minor Planets.—See *Planet*.

Mimas.—A name proposed by Sir John Herschel for the first or interior satellite of the planet *Saturn*.

Mira.—A name given to a remarkable variable star in the constellation *Cetus*, known also as *o Ceti*.

Mirach.—A name given to one of the brighter stars in the constellation *Andromeda*.

Monoceros.—One of the constellations introduced by Hevelius.

Moon.—A secondary planet; the satellite or constant attendant of the earth, round which her revolution is performed.

Moon, Full.—The moon is said to be *full* when her whole illuminated surface is turned towards us: she is then in *opposition* or diametrically opposite to the sun.

Moon, New.—The moon is said to be *new* when she is in *conjunction* with the sun, or between that luminary and the earth.

Moon-culminating Stars, are certain stars which being situated near the same parallel of declination as the moon, and not differing greatly from her in right ascension,

are proper objects for comparison with her, with a view to the determination of the longitudes of places.

Motion, Direct.—A body is said to have *direct* motion when it advances in the order of the signs of the zodiac, or in the direction of the earth's annual revolution.

Motion, Retrograde.—A body is said to have *retrograde* motion when it proceeds contrary to the order of the signs, or to the direction of the earth's annual revolution.

Motion, Sidereal.—The motion of a body in respect to the fixed stars.

Motion, Tropical.—The movement of a body in respect to the equinox or tropic which has itself a slow motion among the stars. See *Precession*.

N.

Nadir.—The point immediately beneath an *observer*; it is one of the poles of the *rational* horizon; the opposite pole being the zenith.

Nebula.—A collection of stars so closely congregated as to require large telescopes to separate them: there are some nebulae, however, so distant as to defy the powers of the best telescopes to resolve them into stars; they appear as whitish spots on the black ground of the sky.

Nebular Theory.—A theory advanced by the great mathematician Laplace, which supposes the gradual formation of planets from nebulous matter, and aims at other conclusions, which are hardly consistent with more recent observations and discoveries.

Neptune.—A superior planet, the most distant at present

known; the recent discovery of this planet, from the effects it had produced upon the movements of Uranus, is considered one of the most wonderful events in modern science.

Nodes are those points in the orbit of a planet or comet where it intersects the ecliptic. The *Ascending Node* is the point where it passes from the south to the north side of the ecliptic; the *Descending Node* is the opposite point where the latitude changes from north to south. The imaginary line passing through the nodes, is called the *Line of Nodes*.

Node, Longitude of the.—The distance from the first point of Aries, of the ascending node of the orbit of a planet or comet.

Nonagesimal degree of the ecliptic, is the point which is at the greatest altitude above the horizon.

Norma.—One of the southern constellations, introduced by Lacaille.

North-following.—See *Quadrant*.

North-preceding.—See *Quadrant*.

Nubeculæ, Major and Minor,—two great cloudy-looking spots in the southern heavens, which, under telescopic examination, are found to consist of a vast number of nebulae and clusters of stars. They are popularly known as the *Magellanic Clouds*.

Nucleus of a Comet.—The condensed, or star-like part of the head. Some comets are without perceptible nuclei.

Nutation.—An oscillatory motion of the earth's axis, due chiefly to the action of the moon upon the spheroidal

figure of our globe. This effect was discovered by Dr. Bradley, the third Astronomer Royal at Greenwich.

O.

Oberon.—A name given by Sir John Herschel to one of the larger satellites of Uranus.

Obliquity of the Ecliptic.—The inclination of the ecliptic to the equator, which amounts at present to about $23^{\circ} 27'$.

Occultation, as a general term, implies the eclipsing of one heavenly body by another. It is, however, commonly used to denote the eclipses of stars and planets by the moon, during her revolution about the earth.

Octans.—One of the southern constellations, introduced by Lacaille. The south pole of the equator falls in this constellation.

Ophiuchus, sometimes called *Serpentarius*.—One of the ancient constellations.

Opposition.—A heavenly body is said to be in opposition to the sun, when its longitude differs 180° , or half the circumference.

Orbit.—The path described by a planet or comet about the sun.

Orion.—One of the ancient southern constellations.

P.

Pallas.—One of the minor planets. See *Planet*.

Parallaxic Angle.—See *Angle of Situation*.

Parallaxic Inequality.—An irregularity in the motion of the moon, arising from the difference in the sun's at-

traction when she is passing over that part of her orbit nearest to the sun, to what it is when she traverses the opposite portion.

Parallax is an apparent change in the position of an object, arising from a change of the observer's station. It diminishes the altitude of an object in the vertical circle. Its effect is greatest in the horizon, where it is termed the *horizontal parallax*, and vanishes entirely in the zenith. The positions of the planets and comets, as viewed from the surface of the earth, differ from those they would occupy were they observed from its centre by the amount of the parallax ; and as it is necessary in practical astronomy to refer all apparent positions of these bodies to the centre of our globe, the application of parallax is a very important matter. The stars are so distant, that their positions are the same from whatever part of the earth they are seen ; but astronomers have endeavoured (in some instances successfully) to discover the amount of variation in their places when observed from opposite points of the earth's annual orbit. This change of position, which is always extremely minute, is termed the *annual parallax* ; and the former effect, due to the observer's station on our globe, has been called the diurnal parallax.

Parallax, Equatorial Horizontal, of the sun or moon, is the greatest angle subtended by the earth's equatorial semi-diameter as seen from the sun or moon.

Parallels of Declination are secondary circles, parallel to the celestial equator.

Parthenope.—One of the minor planets. See *Planet*.

Pavo.—One of the southern constellations, introduced by *Lacaille*.

Pegasus.—One of the ancient northern constellations.

Penumbra.—The lighter shade which surrounds the dark shadow of the earth in an eclipse of the moon. The name is also used to indicate the light shade which usually encircles the black spots upon the sun's disc.

Perigee.—That point in the orbit of the moon where she is nearest to the earth, or the point in the earth's orbit where our globe is nearest to the sun. It is also used as a general term to denote the least distance of a body from the earth.

Perihelion.—That point in the orbit of a planet or comet which is nearest to the sun.

Perihelion Distance.—The least distance of a planet or comet from the sun.

Perihelion, Longitude of.—The distance of the perihelion point from the first point of Aries, reckoned usually upon the plane of the ecliptic to the node, and thence upon the orbit.

Perihelion, Passage through.—The time of Perihelion passage, is the moment when a planet or comet arrives at its least distance from the sun, and is one of those numbers which are usually given for the purpose of predicting the future positions of the object.

Periodic Time.—The interval of time which elapses from the moment when a planet or comet leaves any point in its orbit, until it returns to it again.

Periodical Meteors.—See *Meteors*.

Perturbations.—The effects of the attractions of the heavenly bodies upon each other, whereby they are sometimes drawn out of their elliptic paths about the central body.

Phases of the Moon.—The different figures assumed by the illuminated portion of the moon's disc during a lunation.

Phase, Greatest.—In an eclipse of the sun or moon, the greatest phase is said to occur when the largest portion of the disc of the luminary is hidden.

Phoenix.—One of the southern constellations.

Physical Astronomy is that department of the science which treats of the *causes* of the motions of the heavenly bodies.

Pictor.—An abbreviation of *Equuleus Pictorius*, one of the southern constellations, introduced by Lacaille.

Pisces.—The *twelfth* sign of the zodiac, which the sun enters about the 21st of February. It is one of the zodiacal constellations.

Pisces Australis.—One of the ancient southern constellations.

Planet, Primary.—The primary planets are those opaque bodies which revolve about the sun as a centre, in orbits not very widely differing from circles. They are twenty eight in number—viz., *Mercury, Venus, the Earth, Mars, the twenty minor planets* (see below) *Jupiter, Saturn, Uranus, and Neptune.* Of these, Mercury, Venus, Mars, Jupiter, and Saturn, have been recognised as planets from the remotest antiquity. Uranus was discovered by Sir William Herschel, on the 13th of March, 1781; and Neptune was found on September 23rd, 1846, in consequence of the calculations of M. Le Verrier and Mr. Adams, who had discovered from the anomalous movements of *Uranus*, that a distant planet must exist nearly in

the position where Neptune was situated. Mercury and Venus, which revolve in orbits interior to the earth's path, are called *inferior* planets. The others, which are outside the earth's orbit, are termed *superior* planets.

Planets, Minor.—The twenty *minor planets*, or *Asteroids*, as Sir William Herschel termed them, revolve between the orbits of Mars and Jupiter, and have all been discovered since the commencement of the present century. The following is a list of these bodies, with the dates when they were found, and the names of their respective discoverers:—

- Ceres* . . . 1801, January 1, by G. Piazzi, at Palermo.
Pallas . . . 1802, March 28, by W. Olbers, at Bremen.
Juno . . . 1804, September 1, by C. L. Harding, at Göttingen.
Vesta . . . 1807, March 29, by W. Olbers, at Bremen.
Astræa . . . 1845, December 8, by K. C. Hencke, at Driessen (Prussia).
Hebe . . . 1847, July 1, by K. C. Hencke, at Driessen.
Iris . . . 1847, August 13, by J. R. Hind, in London.
Flora . . . 1847, October 18, by J. R. Hind, in London.
Metis . . . 1848, April 25, by A. Graham, at Markree, (Sligo).
Hygeia . . . 1849, April 12, by A. de Gasparis, at Naples.
Parthenope . . . 1850, May 11, by A. de Gasparis, at Naples.
Victoria . . . 1850, September 13, by J. R. Hind, in London.
Egeria . . . 1850, November 2, by A. de Gasparis, at Naples.
Irene . . . 1851, May 19, by J. R. Hind, in London; and on May 23, by A. de Gasparis, at Naples.
Eunomia . . . 1851, July 29, by A. de Gasparis, at Naples.

Psyche . . 1852, March 17, by A. de Gasparis, at Naples.

Thetis . . 1852, April 17, by R. Luther, at Bilk, near Düsseldorf.

Melpomene . 1852, June 24, by J. R. Hind, in London.

Fortuna . . 1852, August 22, by J. R. Hind, in London.

Massalia . . 1852, Sept. 20, by Chacornac, at Marseilles.

Planet, Secondary.—The secondary planets are the satellites, or moons, which revolve about some of the primary planets. The moon is a secondary to the earth.

Pleiades.—A remarkable cluster of stars in the constellation Taurus, seven or eight of which are visible to the naked eye. The telescope reveals more than two hundred.

Polar Distance.—The angular distance of a heavenly body from one of the poles counted on from 0° to 180° .

Poles of the Equator are those points in the heavens towards which the axis of the earth is directed.

Pole-star, or Polaris.—A name by which the star α , in Ursa Minor, is distinguished on account of its proximity to the North Pole of the equator. Round this star the others appear to revolve in the course of a day.

Pollux.—A bright star in the constellation Gemini, called also β Geminorum.

Practical Astronomy is a term which includes the determination of the magnitudes, distances, &c., of the heavenly bodies, the manipulation of astronomical instruments, and everything relating to the conducting of an observatory.

Precession of the Equinoxes.—A slow motion of the equinoctial points in the heavens, whereby the longitudes

of the fixed stars are increased at the present rate of about $50\frac{1}{4}''$ annually, the equinox having a retrograde motion to this amount. The effect is produced by the attraction of the sun, moon, and planets upon the spheroidal figure of the earth. The *general* precession includes the small variation caused by the planet Venus, &c. The *luni-solar* precession is the joint effect of the sun and moon only.

Prime Vertical.—The great circle passing through the zenith, and the east and west points of the horizon.

Procyon.—The principal star in the constellation Canis Minor, and sometimes called α Canis Minoris.

Proper motion of the Stars, is a movement which some stars are found to possess, independent of the apparent change of place due to the precession of the equinoxes, and which may be owing either to an *actual motion of the star itself* or to the *motion of the solar system in space*, or it may be the result of the two combined. The observations of modern astronomers would lead to the conclusion, that both causes operate to produce the effect; and it is a received opinion at the present day, that the sun and his attendant planets and comets are in motion towards a point situate in the constellation Hercules; this supposition appearing to reconcile many of the otherwise anomalous changes of position exhibited by the fixed stars; while to account for the rest, certain of these objects are considered to have a rapid actual motion in the heavens.

Psyche.—One of the minor planets. See *Planet*.

Q

Quadrant.—The fourth part of the circumference, or 90° .

In speaking of double-stars, or of two objects near each other, the position of one component in reference to the other is frequently indicated by the terms,—north-following, north-preceding, south-following, or south-preceding—the word quadrant being understood: one star being said to follow or precede according as its right ascension is greater or less than that of the other.

Quarter, First, of the moon. When our satellite appears exactly as a half-moon, or when her angular distance from the sun is 90° towards the East, she is said to be in the *first quarter*. In this case the western half of the moon is illuminated.

Quarter, Last, of the moon. When our satellite appears exactly as a half-moon, or when her angular distance from the sun is 90° towards the West, she is said to be in the *last quarter*. In this case the eastern half of the moon is illuminated.

R

Radius-vector.—An imaginary line joining the centres of the sun and of a planet or comet in any point of its orbit. It is therefore the measure of the *real* distance between the two bodies.

Reduction of Observations.—The process of calculation, by which observations are rendered subservient to the uses of astronomy. Thus an observation of the time of *transit* of a planet over the meridian of any place requires correction for the error of the clock, and for

any small errors in the position of the instrument; the application of these corrections forms the process of reduction.

Reflex Zenith Sector.—A new instrument recently erected at the Royal Observatory, Greenwich, for the measurement of small zenith distances.

Refraction.—Owing to the property which the air possesses, a ray of light from a star, in entering the earth's atmosphere, is bent downwards towards its surface, and will therefore reach the eye of an observer with a different direction to that it would have had if no atmosphere existed. This *refraction*, or bending of the rays of light, causes all the heavenly bodies to appear at a greater altitude above the horizon than they really are, and the accurate numerical determination of the amount of refraction is of the utmost importance in many classes of astronomical observations.

Regulus.—The principal star in the constellation Leo, called also α Leonis.

Resisting Medium.—See *Medium*.

Reticulum.—One of the southern constellations introduced by Lacaille.

Retrograde Motion.—See *Motion*.

Revolution, Time of,—in relation to a planet or comet, is the time occupied in completing a circuit round the sun, and is a synonymous term with *periodic time*. If the interval be reckoned from one perihelion or aphelion to another, it is called the *anomalous* revolution; if it be taken in reference to the equinoxes or tropics, it is called a *tropical revolution*; if in re-

ference to the fixed stars, a *sidereal* revolution ; and if the period between two passages through either of the nodes be taken, it is called a *synodical* revolution. All these will differ, for the anomalistic, synodical, and tropical periods are dependent upon the motion of the lines of apsides, nodes, and of the equinoxes respectively.

Rhea.—A name proposed by Sir John Herschel for the *fifth* satellite of Saturn, and now generally adopted.

Rigel.—One of the bright stars in Orion, called also β Orionis.

Ring-Micrometer, called also the *Annular* Micrometer, is a small circle of brass, so fixed in the eyepiece of a telescope as to appear to the observer suspended in the centre of the field of view. To determine the position of an unknown object with this instrument, the moments of its disappearance and reappearance on the outer and inner edges of the ring are noted, and the same being done for one or more known stars in the vicinity, a short calculation by trigonometry gives the difference of right ascension and declination. It is necessary to know the apparent diameter of the ring in arc with considerable exactness.

S.

Sagitta.—One of the ancient northern constellations.

Sagittarius.—The *ninth* sign of the zodiac, which the sun enters about the 21st of November ; it is one of the zodiacal constellations.

Satellites are the secondary planets, or moons, which revolve about some of the primary planets ; the Moon is a satellite of the Earth. Jupiter is accompanied

by four satellites, discovered in 1610 by Galileo, and distinguished as the first, second, third, and fourth, reckoning in order of distance from the planet. *Saturn* has eight satellites, the names, with the dates of discovery, being :—

1. *Mimas* . . 1789, September 17, by Sir W. Herschel.
2. *Enceladus*. 1787, August 19, by Sir W. Herschel.
3. *Tethys* . . 1684, March, by Cassini.
4. *Dione*. . . 1684, March, by Cassini.
5. *Rhea* . . . 1672, December 23, by Cassini.
6. *Titan*. . . 1655, March 25, by Huyghens.
7. *Hyperion* . 1848, Sept. 18, by Lassell and Bond.
8. *Japetus*. . 1671, October, by Cassini.

Titan and Japetus may be seen with telescopes of moderate power, the others require instruments of great optical capacity: *Mimas* is visible only in the largest telescopes hitherto constructed. *Uranus* has several satellites, probably six, that being the number which Sir William Herschel considered he had seen. Four only have been observed with certainty of late years, by Sir John Herschel, Mr. Lassell, and Mr. Otto Struve—viz.,

<i>Ariel</i> ,	which has a period of	2 ^d	12 ^h
<i>Umbriel</i> ,	"	"	4 4
<i>Oberon</i> ,	"	"	8 17
<i>Titania</i> ,	"	"	13 11

Neptune has one satellite, detected by Mr. Lassell in 1846. This object, like the smaller satellites of *Saturn* and the attendants of *Uranus*, is only perceptible with the most powerful telescopes in existence.

Saturn.—One of the ancient superior planets, remarkable for the luminous rings with which his globe is surrounded, and for the large number of moons circulating round him.

Saturnicentric.—Having relation to the centre of the planet Saturn.

Schedar.—The principal star in the constellation Cassiopea, known to astronomers as α Cassiopeæ.

Scintillation of the stars is, that curious optical effect, popularly termed *twinkling*, supposed to be due to what is called the *interference of light*.

Scorpio.—The *eighth* sign of the zodiac, which the sun enters about the 22nd of October; it is one of the zodiacal constellations.

Sculptor.—An abbreviation for *Apparatus Sculptoris*, one of the southern constellations introduced by Lacaille.

Secondary Planet.—See *Planet*.

Secular Acceleration of the moon's mean motion, is caused by a slow change in the excentricity of the earth's orbit, which has sensibly diminished the length of the moon's revolution, since the time of the earliest observations. Dr. Halley first noticed this effect, which was afterwards explained by Laplace.

Secular Inequality.—See *Inequalities*.

Selenocentric, having relation to, or as seen from, the centre of the moon.

Selenography.—The description and delineation of the surface of the moon.

Semi-diurnal Arc, is half the arc described by a heavenly body between its rising and setting.

Serpentarius.—See *Ophiuchus*.

Sexagesimal division of the Circle, is that usually employed at the present time, except for certain astronomical tables. The circumference is divided into 360 degrees, each degree into 60 minutes, and each minute into 60 seconds.

Sextans.—One of the constellations introduced by Hevelius.

Sextant.—An instrument for measuring distances between the heavenly bodies, or their altitudes above the horizon. The name is derived from the fact of its possessing a graduated arc of a circle, 60° , or one *sixth* of the circumference, in length.

Sidereal Motion.—See *Motion, Sidereal*.

Sidereal Period.—See *Revolution*.

Sidereal Time.—See *Time*.

Signs of Zodiac.—The twelve divisions into which the ancients divided the zodiac. In the reckoning of longitudes a sign is 30° : it amounts to the same thing to say that the longitude of a planet is $5^s 10^\circ 52'$ (which is $10^\circ 52'$ in the sign Virgo), or that it is $160^\circ 52'$; but the former mode of expression is very rarely adopted at the present day. See *Zodiac*.

Sirius.—The principal star in the constellation Canis Major, and the brightest in the heavens: it is called also a Canis Majoris, and, by the ancients, was termed the *Dog-star*.

Solar System.—The sun, planets, and comets, which are supposed to form a system independent of the surrounding fixed stars.

Solstices are the times when the sun passes through the solstitial points.

Solstitial Colure.—A great circle passing through the poles and the solstitial points.

Solstitial Points.—The two points where the tropics meet the ecliptic, in longitude 90° and 270° .

Spica.—The principal star in the constellation Virgo, known also as α Virginis.

Spots of the Sun, or Maculæ, are black spots of various forms, surrounded by a lighter shade or *penumbra*, which are usually to be seen upon the sun's disc.

Star, Binary.—See *Binary System*.

Star, Double.—See *Double-Star*.

Star, Fixed.—To distinguish those innumerable shining bodies which are scattered over the heavens from pole to pole, from the planets of our system, they are termed the *fixed* stars, owing to their apparent fixity in the sky; but this appellation is to be received only in a comparative sense: the stars appear *fixed* when compared with the rapidly moving bodies which we call *planets*, although it is certain that many of them are in motion through space at a rate vastly greater than that of the earth in her orbit.

Star, Temporary.—The irregular or temporary stars are those which have suddenly become visible in various regions of the sky, and after attaining a greater or less degree of brightness have as suddenly vanished. Such stars appeared in 1572, in the constellation Cassiopea, during the time of Tycho Brahe, and in 1604, in the constellation Ophiuchus, while Kepler was studying the heavens.

Star, Variable.—The variable stars are those which are found to exhibit *periodical* fluctuations of brightness.

Every year adds to their number. The star β Persei, or Algol, varies between the second and fourth magnitudes in about $2^d 21^h$, and there are many others which have periods less than one year. Mira, or α Ceti, was the first variable star discovered; when brightest it is conspicuous to the naked eye, at other times it is *invisible*, even with powerful telescopes.

Stationary Points of a planet's orbit are those in which, as viewed from the earth, it appears to have no motion amongst the stars.

Sun.—The central body of the planetary system, and the originator of light and heat. It is a vast globe more than 880,000 miles in diameter.

Superior Conjunction.—When an inferior planet is situated in the same longitude as the sun, and has that luminary between it and the earth, it is said to be in superior conjunction.

Superior Planets.—See *Planet*.

Synodical Period, or Revolution.—See *Revolution*.

Syzygy.—Either conjunction or opposition, in reference to the orbit of the moon.

T.

Tables, Astronomical.—The calculation of the apparent places of the sun, moon, and planets, is greatly facilitated by the formation of tables, in which the numbers representing their orbital elements and movements are so expressed, that their geocentric positions may be readily determined from them for any required epoch. The best solar tables are those of Carlini. MM. Burckhardt and Damoiseau have published tables of the moon. The tables of Mercury, Vienna,

and Mars, in present use, were constructed by Baron von Lindenau, and those of Jupiter, Saturn, and Uranus, by M. Bouvard.

Tail of a Comet.—A train of light which accompanies large comets, extending in a direction nearly diametrically opposite to that of the sun. Occasionally the tail is of an enormous length : there are instances on record where the head of the comet has been just clear of the horizon while its tail extended to the zenith. Sometimes the tail is divided into two branches, in which cases it is termed *bifid*.

Taurus.—The *second* sign of the zodiac, which the sun enters about the 20th of April ; it is one of the zodiacal constellations.

Telescopium.—One of the southern constellations introduced by Lacaille.

Temporary Stars.—See *Star, Temporary*.

Tethys.—A name proposed by Sir John Herschel for the *third* satellite of Saturn, and now generally adopted.

Thetis.—One of the minor planets. See *Planet*.

Tides.—The periodical rising and falling of the waters of the ocean, owing to the attraction of the sun and moon, but especially of the latter. When both luminaries act in the same direction, the tides are greatest, and are then termed *Spring* tides ; when the sun and moon are 90° apart, their effects partly counteract each other, and the tides, which are then much less, are termed *Neap* tides.

Time, Apparent, is the time resulting from an observation of the sun.

Time, Equinoctial.—A method of reckoning time for astronomical purposes, suggested some years since by Sir John Herschel. The object of equinoctial time is to avoid the necessity of mentioning the place to which the time of an observation refers, for 8^h mean time at Greenwich is not 8^h on any other meridian, but differs therefrom by the longitude of the place east or west. Sir John Herschel proposed the moment of the vernal equinox as a starting point for the reckoning of time, which would be common to all nations.

Time, Mean.—The interval between the times of transit of the sun over the meridian on successive days is not always the same, and consequently the length of the true solar day varies, the cause of the variation being the unequal progress of the sun in the ecliptic. But in order to have an equable measure of time, astronomers suppose a *mean sun* to revolve with the real sun's mean or average motion in the ecliptic, and a clock regulated by this fictitious sun shows *mean time*. The difference between *apparent* and *mean time* is called the *Equation of Time*, the clock being sometimes before the sun, *i. e.*, showing *noon* before the true sun arrives on the meridian, and at others after it.

Time, Sidereal, is the time shown by a clock regulated by the fixed stars. The sidereal day is 3^m 56^s shorter than the mean solar day, and hence sidereal time gains upon mean time by this amount daily.

Titan.—A name proposed by Sir John Herschel for the *sixth* satellite of Saturn, and now generally adopted.

Titania.—A name proposed by Sir John Herschel for one of the brighter satellites of Uranus.

Toucan.—One of the southern constellations introduced by Lacaille.

Transit Instrument.—A telescope provided with vertical wires, and revolving upon an axis in the plane of the meridian, with which the right ascensions of the stars and planets are determined. It is found in most observatories, and was used at Greenwich till the year 1851, when an improved transit-circle was substituted.

Transit of Mercury or Venus—These planets being situated between the sun and the earth, occasionally appear to us to pass over his disc, from west to east; a phenomenon termed a *transit*. It is from accurate observations of the transits of Venus which happened in the years 1761 and 1769, that astronomers have been able to fix the exact distance of the sun from the earth.

Transits of Satellites, &c., of Jupiter.—With a powerful telescope, the four moons by which the planet Jupiter is attended may frequently be observed to pass across his disc, followed or preceded, as the case may be, by their black *shadows*, projected as round spots upon his surface. Occurrences of this kind are called *transits of the satellites* or of their *shadows*.

Transit, Upper and Lower.—When a star passes over the meridian of any place, *i. e.*, the great circle passing through the zenith and the north and south points of the horizon, it is termed the *upper* transit; and when it arrives on the meridian, differing 180° from that of the place on the opposite side of the earth, the *lower* transit takes place.

Triangulum.—An ancient northern constellation.

Triangulum Australe.—One of the southern constellations introduced by Lacaille.

Tropical Revolution.—See *Revolution*.

Tropics.—Two circles of declination, touching the ecliptic at its greatest distances from the equator, north and south, or at the beginning of Cancer and Capricorn. That at the beginning of Cancer is called the *Tropic of Cancer*, the other the *Tropic of Capricorn*.

U.

Ultra-zodiacal.—Beyond the limits of the zodiac. It is a term frequently applied to the minor planets, some of which pass without the ancient zodiac in the course of their revolution round the sun.

Umbra.—The dark shadow of the earth, moon, or other planet. It is owing to the moon's entrance into the earth's *umbra* that a lunar eclipse takes place.

Umbriel.—A name given by Sir John Herschel to one of the interior satellites of Uranus.

Uranography.—The delineation of the constellations, &c., upon charts or globes.

Uranus.—A superior planet, discovered by Sir William Herschel on March 13th, 1781, and the most distant from the sun with which we were acquainted until the discovery of Neptune in the year 1846. This planet was formerly termed *Herschel*, or the *Georgium Sidus*, but these names have now fallen into disuse.

Ursa Major.—One of the ancient northern constellations.

Ursa Minor.—One of the ancient northern constellations. The north pole of the equator is situate in *Ursa Minor*.

V.

Variation, Annual.—See *Annual Variation*.

Variation of the Moon.—An inequality in the movement of our satellite, amounting at certain times to 37' in longitude. It is remarkable as having been distinctly noticed by Tycho Brahe, and as being the first of the lunar inequalities explained by Sir Isaac Newton on the principles of gravitation.

Vega.—The bright star in the northern constellation Lyra, called also α Lyrae.

Venus.—One of the inferior planets, and the second in order of distance from the sun.

Venus, Transit of.—See *Transit*.

Vesta.—One of the minor planets. See *Planet*.

Via Lactea, called also the *Galaxy*, or *Milky Way*, is that irregular luminous band, which may be seen on any dark night, stretching across the sky from horizon to horizon. It is found to consist of myriads of stars, too distant to be seen separate, except in some less crowded regions, under the most powerful telescopic aid. Sir John Herschel has given a minute description of the course of the *Via Lactea* through the various constellations. The brightest portions visible in these latitudes are in the neighbourhood of Cygnus and Scorpio.

Victoria.—One of the minor planets. See *Planet*.

Virgo.—The fifth sign of the zodiac, which the sun enters about the 21st of August; it is one of the zodiacal constellations.

Volans.—An abbreviation of *Piscis Volans*, one of the southern constellations introduced by Lacaille.

Volume.—The contents of the globe of a planet, usually given in its proportion to that of the earth.

Vulpecula.—One of the northern constellations introduced by Hevelius.

W.

Wire-Micrometer.—An instrument much used in delicate astronomical observations. It contains vertical and horizontal wires, the latter moveable upwards or downwards, so as to allow of being placed upon any star in the field of view: the frame containing the wires has a circular rackwork motion, which enables the observer to place them at any angle he may please with respect to the meridian. A scale, or *comb* (as it is usually termed), is attached with equi-distant divisions or teeth to mark the space passed over by the wires, and the distance in arc between these divisions is supposed to be known. There are two methods of fixing the place of an object with the wire-micrometer in reference to a star near it, the position of which has been determined—1st, by noting the moments when each star traverses a wire adjusted vertically, which gives at once the difference of right ascension, and measuring with the moveable horizontal wires the difference in their declinations. 2nd, By turning the fixed wire round till both objects are covered by it, and reading off from a divided circle purposely attached, the *angle of position*: the *distance* in arc between the stars is then found with the moveable wires, and by a trigonometrical calculation the angle and distance are transformed into differences of right

ascension and declination. The latter method has some advantages if the two objects to be observed are nearly in the same right ascension.

Y.

Year.—The duration of the earth's revolution round the sun, or of the apparent revolution of the sun in the ecliptic. The *sidereal year* is the time which elapses between the sun's leaving a fixed star until his next return to it, and consists of $365^{\text{d}} 6^{\text{h}} 9^{\text{m}} 9.6^{\text{s}}$. The *tropical year* marks the interval between two passages through the tropics, or the equinoctial points, and is therefore affected by the precession of the equinoxes; it is shorter than the sidereal year, and in 1850 consisted of $365^{\text{d}} 5^{\text{h}} 48^{\text{m}} 49.7^{\text{s}}$. The *anomalous year* denotes the time between two successive passages of the earth through its aphelion or perihelion points; and as these have a slow motion forwards in the heavens, the anomalous year is longer than the *sidereal*; it consists of $365^{\text{d}} 6^{\text{h}} 13^{\text{m}} 49.3^{\text{s}}$.

Z.

Zodiac.—A zone or belt of the heavens extending 9° on either side of the *ecliptic*, and therefore 18° in breadth, within which the sun and all the larger planets perform their annual revolutions. The zodiac was divided by the ancients into twelve signs, each measuring 30° along the ecliptic: these are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces.

Zodiacal Light.—A conical-shaped light, which is frequently to be observed in these latitudes in the spring,

or early part of the year, above the western horizon, its axis lying either exactly or very nearly in the ecliptic. Its usual length from the base to the vertex or upper point of the cone is about 50° , but on some occasions it has been traced to a distance of 90° or 100° from the place of the sun, with which body it has been generally supposed to have some connexion. Its precise nature, however, is not at present understood. The zodiacal light may be observed about the autumnal equinox, on clear mornings, above the eastern horizon; but its appearance under the most favourable circumstances in these latitudes is said to fall far short of its aspect in the tropics, where it is far brighter and more distinctly defined.

Zone of Declination.—A belt of the heavens included between certain parallels of declination.

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